

TITLE OF THE INVENTION

COMMUNICATION DEVICE AND COMMUNICATION SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This application is based upon and claims the
benefit of priority from prior Japanese Patent
Application No. 11-245737, filed August 31, 1999, the
entire contents of which are incorporated herein by
reference.

BACKGROUND OF THE INVENTION

10 The present invention relates to a communication
device such as a PHS terminal which provides not only a
function for communicating mail documents but also a
function for communicating information specific to the
current position, as well as a communication system
15 using such a communication device.

Recent digital cellular telephones and PHS
(Personal Handyphone System: second-generation codeless
telephone system) terminals can transmit not only
voices but also mail documents or handwritten images.
20 In creating and transmitting mail documents, addition
of information specific to the current position of the
terminal (for example, an image representing a scene
peculiar to that region) makes the mail document appear
attractive to please the receiver.

25 However, whether the image attached to the mail
document is manually created or selected from a
plurality of prepared images, the creation or selection

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of the attached image requires much time and labor even if the mail document is simple. This disadvantageously dampens the sender's mood to transmit the mail document easily.

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BRIEF SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide communication device and communication system that enable a sender to select information depending on the current position of the sender's communication terminal device and attach it to a mail document for transmission.

According to the present invention, there is provided a communication device comprising mail creation means for creating an electronic mail, means for detecting the current position of the communication device, and transmission means for attaching information corresponding to the current position to the electronic mail and transmitting the electronic mail with the information being attached.

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According to the present invention, there is provided another radio communication system comprising a communication terminal, and a cell station connecting to the communication terminal via a radio channel, wherein the communication terminal comprises mail creation means for creating an electronic mail, means for detecting the current position of the communication device, and transmission means for attaching

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information corresponding to the current position to the electronic mail and transmitting the electronic mail with the information being attached.

5 According to the present invention, there is provided a still another radio communication system comprising a communication terminal, and a cell station connecting to the communication terminal via a radio channel, wherein the communication terminal comprises mail creation means for creating an electronic mail, means for detecting the current position of the
10 communication device, and transmission means for attaching position information indicating the current position to the electronic mail and transmitting the electronic mail with the position information being
15 attached to the cell station, and the cell station comprises means for attaching regional information corresponding to the current position based on the position information and for transmitting the electronic mail with the regional information being
20 attached.

Additional objects and advantages of the present invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the
25 present invention.

The objects and advantages of the present invention may be realized and obtained by means of the

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instrumentalities and combinations particularly pointed out hereinafter.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

5 The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate presently preferred embodiments of the present invention and, together with the general description given above and the detailed description of the preferred embodiments given below, serve to explain the principles of the present invention in which:

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FIG. 1 is a view showing the entire configuration of a communication system according to a first embodiment of the present invention;

15 FIG. 2 is a block diagram showing the configuration of a circuit in a PHS terminal according to the first embodiment;

FIG. 3 is a flow chart showing a process carried out in a mail creation mode according to the first embodiment of the present invention;

20 FIG. 4 is a flow chart showing how a mail is created with a PHS terminal according to a second embodiment of the present invention; and

FIG. 5 is a flow chart showing how mail documents are received at a service center according to the second embodiment of the present invention.

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DETAILED DESCRIPTION OF THE INVENTION

A preferred embodiment of the present invention

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will now be described with reference to the accompanying drawings.

First Embodiment

FIG. 1 shows the configuration of a communication system according to the first embodiment where the present invention is applied to a communication service (in this case, the PHS) that can transmit and receive regional images and mail documents using bit maps. A large number of PHS cell stations (CS) 2-1, 2-2, ... 2-N are connected to a network (the PSTN, the ISDN, or the like), and a service center operated by a service company that provides services for transmitting regional images and mail documents through the PHS is also connected to the network.

The PHS terminals (only two are shown, but the number is not limited to two) 4a and 4b can each communicate by executing a position registration process with one of the cell stations 2-1, 2-2, ... 2-N. The PHS terminals 4a and 5b are adapted for communication services for enabling regional images and mail documents to be transmitted and received and are registered in the service center 3 by contracting with the service company.

FIG. 2 shows the configuration of a circuit in each of the PHS terminal 4a and 4b. A transmission and reception section 12 is connected to an antenna 11. Although not shown, the transmission and reception

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section 12 comprises an antenna switch for assigning transmissions/receptions to corresponding addresses, a frequency conversion section for converting frequency between radio signals and IF signals, and a modem.

5 The frequency conversion section accepts inputs via the antenna switch of signals received by the antenna 11 and converts a radio signal in a 1.9-GHz zone into an IF signal in a 1-MHz zone by mixing the signal with a local oscillation signal of a
10 predetermined frequency output from a PLL synthesizer, not shown. The IF signal is supplied to the modem. On the other hand, the frequency conversion section mixes a $\pi/4$ shift GPSK modulated wave (the IF signal) with a local oscillation signal of a predetermined frequency
15 output from the PLL synthesizer, to convert the IF signal in the 1-MHz zone into the radio signal in the 1.9-GHz zone, and then emits the signal from the antenna 11 via the antenna switch.

 The modem demodulates the IF signal from the
20 frequency conversion section to separate it into I and Q data, which are then transferred to a communication control section 13. On the other hand, the modem generates the I and Q data from the data transferred from the communication control section 13 and subjects
25 the data to the $\pi/4$ shift QPSK conversion before outputting them to the frequency conversion section.

 The communication control section 13 is connected

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CODEC and a PCM CODEC. The speech CODEC compresses/
expands digital data. The receiver expands an ADPCM
voice signal ($4 \text{ bits} \times 8 \text{ KHz} = 32 \text{ Kbps}$) transmitted
from the communication control section 13, by decoding
5 it into a PCM voice signal ($8 \text{ bits} \times 8 \text{ KHz} = 64 \text{ Kbps}$),
and then outputs the expanded signal to the PCM CODEC.
On the other hand, the sender compresses the PCM voice
signal transmitted from the PCM CODEC, by coding it
into the ADPCM voice signal, and then outputs the
10 compressed signal to the communication control
section 13.

In addition, the PCM CODEC executes an
analog/digital conversion process. The receiver
subjects a PCM voice signal transmitted from the speech
15 CODEC to a D/A conversion and outputs the obtained
analog voice signal to the speaker 15. On the other
hand, the sender subjects the analog voice signal input
from the microphone 16 to an A/D conversion to obtain
the PCM voice signal and outputs it to the speech CODEC.

20 The transmission and reception section 12,
communication control section 13, and voice processing
section 14 are connected to the control section 17,
which connects to a display section 18, key input
section 19, ROM 20, RAM 21, and transmission and
25 reception buffer 22.

The control section 17 comprises a CPU or the like
to control the entire device based on a predetermined

program stored in the ROM 20. The ROM 20 stores programs for control operations such as communication controls, speech data transmissions and receptions, and creation and transmission of mail documents and regional images which are all executed by the control section 17, character pattern data corresponding to a character text code, regional image data as stamp images which correspond to areas to which identification information (hereafter simply referred to as "CS-ID") on the cell stations 2-1, 2-2, ... 2-N throughout Japan is assigned (the regional image data indicates a scene, a logo mark, or the like of each area), and other data.

The RAM 21 has a work area for temporarily storing various data used by the control section 17 for controls, a mail area that stores predetermined numbers of various mail data including transmitted voice data, character text data, and image data, and a directory area that stores sets of destinations and their telephone numbers or mail addresses.

The display section 18 comprises a dot matrix liquid-crystal display panel with a back light which can display, for example, binary image data of 130 × 192 dots, and a drive circuit for the display panel.

The key input section 19 has a dial key, a "send" key, an "off" key, a mode selection key, a cursor key, and other keys for inputting to the control section 17

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a key operation signal for setting a corresponding function.

The transmission and reception buffer 22 comprises a transmission buffer area and a reception buffer area
5 which buffers data to be transmitted and received, respectively.

The operation of this embodiment will be described below.

In this embodiment, a user selects as a sending
10 mode either a normal mode that operates to transmit the mail document as it is and a stamp attachment mode that automatically selects as a stamp image (information specific to the area) a regional image corresponding to the CS-ID on the nearest cell station 2 and attaching
15 the selected image to the mail document for transmission.

FIG. 3 illustrates a process executed by the PHS terminal 4a or 4b if the mode selection key of the key input section 19 is used to select the mail sending
20 mode.

It is determined whether or not the PHS terminal is located within a corresponding communication range (step A1). If it is not located within the communication range, a created mail document cannot
25 be transmitted, so that the display section 18 displays a guide message, for example, "Out of communication range. You can't send mail. Move into communication

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When the "send" key is determined to have been operated, it is determined whether or not the stamp attachment mode has been set (step A5).

5 If the stamp attachment mode has not been set, that is, the normal mode has been set, the communication channel to one of the cell stations is established (step A8), the above described created mail document is transmitted (step A9), and the process returns to a normal standby mode.

10 If the stamp attachment mode is has been set at step A5, the CS-ID temporarily held in the register for the work area of the RAM 21 is used to search the ROM 20 for a stamp image for a corresponding area (step A6), and the read stamp image is attached to the created
15 mail document (step A7).

Then, the communication channel to one of the cell stations is established (step A8), and the created mail with the stamp image attached thereto is transmitted after holding it in the transmission buffer
20 of the transmission and reception buffer 22 (step A9). Subsequently, the channel is disconnected and the process returns to the normal standby mode.

In this manner, the regional image corresponding to the area where the mail document sender is located
25 is automatically selected and attached to the mail document for transmission, thereby enabling easy transmission of the mail document with the image

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attached thereto and corresponding to the current position, without the needs for much time and labor. Consequently, the transmitted mail is sent to the destination terminal via the network and then displayed on the display section of the destination terminal. If the received mail has the stamp image attached thereto, the stamp image is displayed at a predetermined position (for example, in an upper left corner) of a display screen on which the mail document is displayed. As a result, the mail appears like an actual postcard and thus appears attractive.

Although the above embodiment fixedly stores the attached stamp images in the ROM 20, the present invention is not limited to this. For example, a stamp image corresponding to the CS-ID may be downloaded from the service center or the cell station and stored in the memory. Then, each time the stamp images are updated, the new stamp image can be obtained.

In addition, if the stamp image is downloaded once the CD-ID of the area has been obtained (that is, once a control channel to the cell station has been successfully established upon power-on or after the user's movement), the memory for the stamp images is not required. Additionally, since the stamp image cannot be downloaded unless the user visits the corresponding area, the stamp image has an excellent locality and scarcity value.

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the service center 3 stores image data as picture postcard images which corresponds to the areas to which the CS-ID on the cell stations 2-1, 2-2, ... 2-N throughout Japan is assigned. In the first embodiment, the image data are stored in the terminals, so that they must be small-sized and is thus called "stamp images". In the second embodiment, the stored image size is not limited, so that the image data are called "postcard data" because postcards are larger than stamps.

Next, the operation of the above described embodiment will be explained.

In this embodiment, a user also selects as the sending mode either the normal mode that operates to transmit the mail document as it is and the postcard attachment mode that automatically selects as a postcard image (information specific to the area) a regional image corresponding to the CS-ID on the nearest cell station 2 and attaching the selected postcard image to the mail document for transmission.

FIG. 4 illustrates a process executed by the PHS terminal 4a or 4b if the mode selection key of the key input section 19 is used to select the mail sending mode.

It is determined whether or not the PHS terminal is located within a corresponding communication range (step B1). If it is not located within the

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communication range, a created mail document cannot be transmitted, so that the display section 18 displays a guide message, for example, "Out of communication range. You can't send mail. Move into communication range" (step B8) and the speaker 15 emits an intermittent beep sound. Thus, the process is ended and waits for the user to move into the communication range.

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If the PHS terminal is determined to be located within a range where it can communicate with a certain cell station, the CS-ID on the cell station 2, that is, its identification information, is temporarily held in the register for the work area of the RAM 21 as positional information indicating the current position of the terminal. A mail creation process corresponding to a key input on the key input section 19 is sequentially executed. Then, the user specifies the destination of the mail document by using the cursor key to select one of the telephone numbers or mail addresses registered in the directory area of the RAM 21, or using the dial key of the key input section 19 to directly input a telephone number or mail address (the mail creation process: step B2).

The user uses the key input section 19 to determine whether a postcard is to be attached to this mail document (that is, select and set either a postcard attachment mode or the normal mode) (step B3),

operates the "send" key of the key input section 19 to complete the creation of the mail document, and waits for a command for a transmission of the created mail document (step B4).

5 When the "send" key has been operated, it is determined whether or not the postcard attachment mode has been set (step B5).

 If the postcard attachment mode has not been set, that is, the normal mode has been set, the communication channel to one of the cell stations is established (step B7), the above described created mail document is transmitted (step B9), and the process returns to the normal standby mode.

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 If the postcard attachment mode has been set at step B5, the CS-ID temporarily held in the register for the work area of the RAM 21 is attached to the above described created mail document (step B6), the communication channel to one of the cell stations is established (step B7), the mail is transmitted (step B9), and the process returns to the normal standby mode.

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The service center 3, which accepts transmissions from the PHS terminals 4a and 4b, carries out a process for relay of mail documents as shown in FIG. 5.

 First, the service center 3 waits for a mail document to be received from a PHS terminal registered therewith for services (step C1). Upon determining that a mail document has been received, the service

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It is then determined whether or not a CS-ID has been attached to the accepted mail document (step C3). If no CD-ID has been attached to the mail document, the communication channel to the destination is established (step C6), the mail document is transmitted to the PHS terminal of the mail destination (step C7) to complete the series of relay process. The service center 3 then returns to the standby state at step C1.

The service center establishes the channel to the destination (step C6), transmits the mail with the postcard attached thereto (step C7), subsequently disconnects the channel, and then returns to the standby state at step C1.

In this manner, upon receiving the mail document, the service center 3 automatically selects the image corresponding to the current position of the mail document sender and attaches the selected image to the mail document before transmitting the mail document to

the destination. Consequently, the mail sender can transmit the mail document with the image suitable for that area attached thereto, without the needs for much time and labor. If the received mail has a postcard image attached thereto, the postcard image is displayed as the first page of the mail document. As a result, the mail appears like an actual postcard and thus appears attractive.

According to this embodiment, since a large number of images need not be stored in the PHS terminal and the service center 3, which accepts transmitted mail documents, attaches the image, the PHS terminals 4a and 4b can easily transmit mail documents and do not require a memory or the like for storing a large number of images, thereby enabling the scale of the circuit to be reduced.

In addition, in the first and second embodiments, the stamp or postcard image corresponding to the CS-ID is selected, but a plurality of images corresponding to the same CS-ID may be provided so that one of them can be selected randomly or depending on the age, sex, favor, preference, or the like of the PHS terminal user.

In particular, if the service center 3, which is not limited in the capacity of a medium for storing images, provides such a service as to allow the user to select the image taking the time (the season) into consideration, the contents of the service can be

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easily applied to the user, thereby contributing to an increase in the number of service subscribers.

Furthermore, the image information attached to the mail may be advertisements of companies. It is
5 contemplated that the communication service is sponsored by a company and that an advertisement image specific to the area may be attached to the mail document for transmission to deduct part or all of a mail transmission rate. In addition, in the above
10 described embodiments, the information attached to the mail is the images, but the present invention is not limited to this and multimedia information (sentences, voices, animations, or the like) may be used.

In the first and second embodiments, the CS-ID of
15 the nearest cell station 2 that is obtained by the PHS terminal during the normal position registration process is used as a means for identifying the position of the mail document sender. The present invention, however, is not limited to this, but a GPS (Global
20 Positioning System) receiver of a relatively low positioning accuracy may be incorporated to obtain latitudinal and longitudinal information on the current position.

In addition, the present invention can also be
25 easily implemented with a digital portable telephone system or other systems if a digital mobile communication system and its terminals that can

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transmit and receive mail documents are used instead of the PHS and its terminals.

Additional advantages and modifications will readily occur to those skilled in the art. Therefore,
5 the present invention in its broader aspects is not limited to the specific details, representative devices, and illustrated examples shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general
10 inventive concept as defined by the appended claims and their equivalents. For example, the radio communication system has been described, but the present invention is not limited to this, but a system for transmitting mails via a wired line may be used.

15 According to one aspect of the present invention, there is provided a communication device comprising document input means for inputting document data, area-specific information obtaining means for obtaining area-specific information corresponding to the current
20 position, and transmission control means for attaching the area-specific information obtained by the area-specific-information obtaining means to the document data input by the document input means.

With this configuration, the area-specific
25 information such as the image corresponding to the area where the sender is located is automatically attached to the mail document for transmission, whereby the mail

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document imparted with the area-specific information suitable for the area can be easily transmitted without the needs for much time and labor.

5 The above described area-specific information obtaining means may obtain positional information based on the identification information on the nearest cell station which is obtained by radio and select one of plural previously-provided pieces of area-specific information which corresponds to the above described
10 positional information.

With this configuration, in addition to the above described effects, the area-specific information is selected based on the identification information automatically obtained by the device as it moves. This
15 configuration eliminates the needs for any other special positioning means or the like and avoids complicating the configuration of the circuit.

The above described area-specific information obtaining means may obtain the area-specific
20 information corresponding to the nearest cell station from this cell station by radio.

With this configuration, in addition to the above described effects, the device need not have a large amount of area-specific information, thereby enabling
25 the scale of the circuit of the device to be reduced.

According to another aspect of the present invention, there is provided a communication system in

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which a communication terminal transmits document data
or the like to a destination terminal via a service
station connected to a service center, wherein the
communication terminal comprises input means for
5 inputting document data, commanding means for
commanding that area-specific information indicating
the current position be added to the document data, and
means for specifying a destination of the document data,
the communication terminal transmitting the document
10 data, command information, and destination information
to the service center, and wherein the service center
comprises means for storing plural pieces of area-
specific information, selecting, based on the command
information, one of the plural pieces of area-specific
15 information which corresponds to the command
information, attaching the selected area-specific
information to the received document data, and
transmitting the document data to a communication
terminal specified by the destination information.

20 With this system configuration, the communication
terminal attaches to the mail document the command
information commanding the addition of the area-
specific information corresponding to the area where
the sender is located, and the service center, which
25 relays the mail document, attaches the area-specific
information such as the image which corresponds to the
command, to the mail document for transmission.

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Consequently, the communication terminal can easily transmit mail documents and do not require a memory or the like for storing a large number of images, thereby enabling the scale of the circuit to be reduced. On
5 the other hand, the service center can easily appeal the contents of its services to service users by, for example, varying the area-specific information on the same area depending on the season.

The above described command information may be the
10 positional information obtained by the communication terminal and indicating the current position thereof.

With this system configuration, in addition to the above described effects, the service center can easily obtain the area-specific information from the
15 positional information.

The above described command information may be the positional information obtained by the service center and indicating the current position of the communication terminal.

20 With this system configuration, in addition to the above described effects, the communication terminal needs to create no special command information and the required operation can be preformed only by the service center, thereby facilitating new service settings or
25 the like.

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